PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent appln. of: Michio HORIUCHI et al.

Serial No: Not yet assigned

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For: **WIRING SUBSTRATE, METHOD OF MANUFACTURING SAME, AND SEMICONDUCTOR DEVICE**

Examiner: Not yet assigned

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PRELIMINARY AMENDMENT

Sir:

This preliminary amendment relates to the above-reference patent application. Kindly enter this preliminary amendment prior to calculation of the filing fee.

Please enter the following amendment without prejudice:

IN THE CLAIMS:

Amend claims 3-6 and 9 as follows:

- -3.(amended) A wiring substrate according to claim 2, in which the low-elasticity underlayer is made of a material having a Young's modulus of less than 1 GPa measured at a room temperature

(20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C.

4.(amended) A wiring substrate according to claim 3, in which the rerouted wiring is covered with a solder resist layer, and the solder resist layer is made of a resist material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C.

5.(amended) A wiring substrate according to claim 4, in which the low-elasticity underlayer extends between the base material of the wiring substrate and the external-connection terminal, the low-elasticity underlayer in the region of the electronic-part mounting pad and the rerouted wiring has a thickness of 50 μm or more, and the low-elasticity underlayer in the region of the external-connection terminal has a thickness of 10 μm or less.

6.(amended) A wiring substrate according to claim 5, in which the rerouted wiring is formed in a nonlinear pattern, at least, between the electronic-part mounting pad and the external-connection terminal.

9.(amended) A method of manufacturing a wiring substrate according to claim 8, which comprises the steps of:

forming a low-elasticity underlayer from a material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C, on the base material of the wiring substrate;

forming a through-hole that extends from the upper surface of the low-elasticity underlayer to the rerouted wiring on the base material located at the lower surface of the low-elasticity underlayer, at a predetermined position of the low-elasticity underlayer; and

forming, by plating, a connection via-hole in the through-hole, the electronic-part mounting pad, and the rerouted wiring. - -

Add new claims 13-23 as follows:

- - 13. A wiring substrate according to claim 1 in which the low-elasticity underlayer is made of a material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C.

14. A wiring substrate according to claim 1, in which the rerouted wiring is covered with a solder resist layer, and the solder resist layer is made of a resist material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C.

15. A wiring substrate according to claim 2, in which the rerouted wiring is covered with a solder resist layer, and the solder resist layer is made of a resist material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C.

16. A wiring substrate according to claim 1 in which the low-elasticity underlayer extends between the base material of the wiring substrate and the external-connection terminal, the low-elasticity underlayer in the region of the electronic-part mounting pad and the rerouted wiring has a thickness of 50 μm or more, and the low-elasticity underlayer in the region of the external-connection terminal has a thickness of 10 μm or less.

17. A wiring substrate according to claim 2 in which the low-elasticity underlayer extends between the base material of the wiring substrate and the external-connection terminal, the low-elasticity underlayer in the region of the electronic-part mounting pad and the rerouted wiring has a thickness of 50 μm or more, and the low-elasticity underlayer in the region of the external-connection terminal has a thickness of 10 μm or less.

18. A wiring substrate according to claim 3 in which the low-elasticity underlayer extends between the base material of the wiring substrate and the external-connection terminal, the low-elasticity underlayer in the region of the electronic-part mounting pad and the rerouted wiring has a thickness of 50 μm or more, and the low-elasticity underlayer in the region of the external-connection terminal has a thickness of 10 μm or less.

19. A wiring substrate according to claim 1 in which the rerouted wiring is formed in a nonlinear pattern, at least, between the electronic-part mounting pad and the external-connection terminal.

20. A wiring substrate according to claim 2 in which the rerouted wiring is formed in a nonlinear pattern, at least, between the electronic-part mounting pad and the external-connection terminal.

21. A wiring substrate according to claim 3 in which the rerouted wiring is formed in a nonlinear pattern, at least, between the electronic-part mounting pad and the external-connection terminal.

22. A wiring substrate according to claim 4 in which the rerouted wiring is formed in a nonlinear pattern, at least, between the electronic-part mounting pad and the external-connection terminal.

23. A method of manufacturing a wiring substrate according to claim 7, which comprises the steps of:

forming a low-elasticity underlayer from a material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C, on the base material of the wiring substrate;

forming a through-hole that extends from the upper surface of the low-elasticity underlayer to the rerouted wiring on the base material located at the lower surface of the low-elasticity underlayer, at a predetermined position of the low-elasticity underlayer; and

forming, by plating, a connection via-hole in the through-hole, the electronic-part mounting pad, and the rerouted wiring. --

REMARKS

Claims 1-23 are in the application.

The claims have been amended to more particularly point out and distinctly claim applicants' invention by simplifying the dependencies of the dependent claims, and to conform the claims to U.S. practice.

Early and favorable action on the merits of the application are earnestly solicited.

Respectfully submitted,

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MARKED-UP VERSION OF AMENDED CLAIMS

- - 3.(amended) A wiring substrate according to claim [1 or] 2,

in which the low-elasticity underlayer is made of a material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C.

4.(amended) A wiring substrate according to [anyone of] claim[s 1 to] 3, in which the rerouted wiring is covered with a solder resist layer, and the solder resist layer is made of a resist material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C.

5.(amended) A wiring substrate according to [anyone of] claim[s 1 to] 4, in which the low-elasticity underlayer extends between the base material of the wiring substrate and the external-connection terminal, the low-elasticity underlayer in the region of the electronic-part mounting pad and the rerouted wiring has a thickness of 50 μm or more, and the low-elasticity underlayer in the region of the external-connection terminal has a thickness of 10 μm or less.

6.(amended) A wiring substrate according to [anyone of] claim[s 1 to] 5, in which the rerouted wiring is formed in a nonlinear pattern, at least, between the electronic-part mounting pad and the external-connection terminal.

9.(amended) A method of manufacturing a wiring substrate according to claim [7 or] 8, which comprises the steps of:

forming a low-elasticity underlayer from a material having a Young's modulus of less than 1 GPa measured at a room temperature (20 to 30 °C) and a Young's modulus of 10 MPa or less measured at 150 °C, on the base material of the wiring substrate;

forming a through-hole that extends from the upper surface of the low-elasticity underlayer to the rerouted wiring on the base material located at the lower surface of the low-elasticity underlayer, at a predetermined position of the low-elasticity underlayer; and

forming, by plating, a connection via-hole in the through-hole, the electronic-part mounting pad, and the rerouted wiring. - -